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## Taxonomic and floristic notes on neotropical Macromitrioideae (Orthotrichaceae)

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**Abstract.** Upon examination of type material, the following new synonymies are proposed: *Macromitrium altituberosum* Bartr. with *M. carionis* C. Muell.; *M. aureum* C. Muell. with *M. longifolium* (Hook.) Brid.; *M. crumianum* Steere & Buck with *M. lepreurii* Mont.; *M. semimarginatum* C. Muell. with *Groutiella chimborazense* (Spruce ex Mitten) Florsch.; *M. standleyi* Bartr. var. *subundulatum* Bartr. with *M. fulgens* Bartr. In addition, the following synonymies were confirmed: *M. brevipes* C. Muell. with *Groutiella apiculata* (Hook. & Grev.) Crum & Steere; *M. sartorii* C. Muell. with *M. punctatum* (Hook. & Grev.) Brid. Floristic reports include *M. lepreurii* new to Dominica, Guadeloupe, and Panama, and *M. ulophyllum* Mitten is reported for the first time from Central America (Panama) and Venezuela. A complete description including illustration is provided for the first time for the latter species. Lectotypes are chosen for all types examined.

While working on the *Macromitrium* flora of Panama and the Lesser Antilles (Guadeloupe and Dominica) several type specimens of neotropical taxa were examined. Taxonomic and floristic observations are presented here while a complete floristic account will be discussed later.

***Groutiella apiculata*** (Hook.) Crum & Steere (*Bryologist* 53: 146, 1950).

Basionym: *Orthotrichum apiculatum* Hook. (*Musci Exot.* 1: 45, 1818). Typus: Mexico, "prope Xalapam in Regno Mexicano, regione temperata. Humboldt et Bonplant" (Isotypus: NY!).

Syn.: *Macromitrium brevipes* C. Muell. (*Synopsis Muscorum Frondosorum* 1: 728, 1849). Typus: "Insulae Martinique: Hb. Fe•e, Guadeloupe:

Bertero, Trinidad: Sieber." (Lectotypus, here designated: Insulae Trinidad, *Sieber* 28; H-Broth!).

From the three collections used for the original description, only one was found in Brotherus' herbarium. The specimen by Sieber is chosen as the lectotype. It includes two creeping stems with a few erect branches. The first one clearly belongs to *Groutiella apiculata*: the basal cells are short, the margin is well differentiated in the lower half of the leaf, the costa forms a prominent apiculus, and the leaf-margins are strongly revolute when dry. According to Mueller's description, there is little doubt that this was part of the specimen described under *M. brevipes*. The second stem belongs to *Macromitrium*. The

smooth basal cells and the plane lamina would place this stem close to *M. richardii* Schwaegr., the latter however has inrolled leaf-tips when dry. The specimen does not fall within any known and established concept of neotropical *Macromitria*, and has to await further study for identification. *Macromitrium brevipes* was considered a synonym of *Groustiella apiculata* by Grout (1946), however it remains uncertain whether Grout actually saw the type specimen and the name is here lectotypified.

***Groustiella chimborazense*** (Spruce ex Mitt.) Florsch. (Moss. Suriname 215, 1964).

Basionym: *Macromitrium chimborazense* Spruce ex Mitt. (J. Linn. Soc. Bot. 12: 218, 1869). Typus: Ecuador, "Andes Quitensis, ad radices occidentalis montis Chimborazo (3500 ped.), Spruce, n. 110." (Holotypus: NY!).

Syn. nov.: *Macromitrium semimarginatum* C. Muell. (Bull. Herb. Bois. 5: 197, 1897). Typus: Guatemala, "Laguna del Pino, Julio 1870" Bernouilli & Cario s." Coll. N 47" (Lectotypus, here designated: H-Broth!).

*Macromitrium semimarginatum* was removed by Bartram (1949) from the flora of Guatemala. He had not seen authentic material, but based on the description he concluded that it belonged to *Micromitrium* (now *Groustiella* Crum & Steere). Examination of the type material reveals that the species has indeed typical *Groustiella* characters, including a differentiated border, at least in the lower part of the leaves, and roundish to oblate juxta-costal basal cells. The type specimen is in agreement with the species concept of *Groustiella chimborazense* based on its acuminate leaves with a percurrent costa. Therefore, *M. semimarginatum* is placed in synonymy with *G. chimborazense*.

***Macromitrium carionis*** C. Muell. (Bull. Herb. Bois. 5: 199, 1897). Typus: Guatemala, "Cuesta de Lovio, Aug. 1870", Bernouilli & Cario "Coll. N 48" (Lectotypus, here designated: H-Broth!). Syn. nov.: *M. altituberosum* Bartr. in Grout (Bryologist 47: 17, 1944). Type: "Guatemala: Sierra de las Minas: Dept. Zacapa: oak-pine

woods along the upper reaches of Rio Sitio Nuevo, between Santa Rosalia and first waterfall, alt. 1200-1500m., on rock, Jan. 9, 1942, Julian A. Steyermark, 42274." (Isotypus: NY!).

Mueller described *M. carionis* from Guatemala, based on a specimen collected by Bernouilli and Cario. Bartram (1949) excluded this species from the *Macromitrium* flora of Guatemala. He had not seen authentic material, but based on the description, he thought that it "evidently belongs in *Micromitrium* (Mitt.) Schimp. in Besch." (now *Groustiella* Crum & Steere). Examination of type material of *M. carionis* reveals that it does not belong to *Groustiella* as the basal cells are all elongate and tuberculate and grade into an ill-defined marginal border. Instead it is concluded that it is conspecific with *M. altituberosum* Bartram in Grout described from Guatemala as well. Thus the name, *M. carionis* C. Muell., has priority over *M. altituberosum*. *Macromitrium carionis* is a rare, but widespread species in Central America known from Mexico to Panama. The species is easily recognized based on its lingulate, mucronate leaves with prominent teeth on the basal margin (for a detailed description of *M. carionis* see Vitt 1993; under *M. altituberosum*). As already noted by Vitt (1993), *M. carionis* is very similar to *M. stellulatum* (Hornsch.) Brid. which differs from the former species by the absence of well differentiated basal marginal teeth (some specimens had poorly differentiated teeth) and rather low tuberculae on the basal cells. Further studies are needed to establish the taxonomic relationship between the two species. The designated lectotype consists of a single branch with a few leaves.

***Macromitrium fulgens*** Bartr. in Grout (Bryologist 47: 12, 1944). Typus: "On tree, La Palma, Province of San José Costa Rica, (Standley, 38011, type as no. 11)" (Isotypus: NY!).

Syn. nov.: *M. standleyi* Bartr. var. *subundulatum* Bartr. (Cont. Nat. Mus. 26: 86, 1928). Typus: "On tree, Cerro de la Caricias, north of San Indro, Province de Heredia, Costa Rica, altitude 2,000 to 2,400 meters, Paul C. Standley & Juvenal Valerio, March 11, 1926, no. 52096" (Isoty-

pus: NY!).

*Macromitrium fulgenscens* was described by Bartram (1944; to replace *M. fuscescens* Bartr. [Cont. Nat. Mus. 26: 89, 1928]; hom. illeg.) together with several other species of *Macromitrium* from collections made by Paul Standley in Costa Rica. The species is distinguished by smooth basal cells and subquadrate to rectangular, hardly porose upper cells bordered by longer narrow cells. From its habit it is close to *Macromitrium standleyi* Bartr., but the latter has spinulose-dentate marginal cells, strongly porose upper cells, and tuberculate basal cells. Bartram (1928) distinguished a variety from the typical *M. standleyi*, namely var. *subundulatum*, based on its more strongly secund branch leaves and upper cells that are only denticulate or serrulate. Examination of type material (NY!) of this variety reveals that its basal cells are smooth and its upper cells are hardly porose and shorter than in the type variety. The material, despite the fact that its leaves are more narrowly acuminate, is very similar to *M. fulgenscens*. *Macromitrium standleyi* var. *subundulatum* is therefore placed in synonymy with *M. fulgenscens*.

***Macromitrium lepreurii*** Mont. (Ann. Sc. Nat. Bot. 14: 347, 1840). Typus: Guyana, "ad truncos arborum circa Cayennam.-Lepr. Coll. n. 334." (Lectotypus: PC - drawings seen - Isotypus: NY!).

Syn. nov.: *M. crumianum* Steere & Buck (Brittonia 31: 395, 1979). Typus: "Guatemala: on forest tree 10 m above ground, vicinity of Exmibal Camp 2 (La Gloria), NW of Lake Izabal, elev. 400-500 m, 7 May 1966, Gayle C. Jones & Lynden Fayce 3296 "(Holotypus: NY!; Isotypi: ALTA!, BM, C, F, FH, FLAS, H, MEXU, MICH, MO, S, TENN, U, US, USCG).

*Macromitrium lepreurii* was initially described from Guyana. It is characterized by a cucullate calyptra, flat, acute leaves with long-rectangular cells that become shorter (but not round) toward the often serrulate, and asymmetric apex. This combination of characters places it in the Sect. *Reverbatum* (Buck 1990) with *M. dubium* Schimp. ex C. Muell. The latter species differs

by its long acuminate leaves, linear upper cells, and subentire margins. Steere and Buck (1979) described *M. crumianum* from a single locality in Guatemala based on the upper leaf cells remaining similar in size from the costa to the margin and by the absence of plications at the base of the leaves. However, examination of *M. lepreurii*, throughout its range, indicates that the leaf base is not invariably plicate and that the size of the marginal upper cells is variable even within a single specimen. The only character remaining to distinguish the two taxa would be the form of the calyptra. According to Steere and Buck (1979) the calyptra of *M. crumianum* is "plicate, fringed at the bottom third or half, naked, but papillose at apex from projecting thickened cell ends", which suggests that it was a mitrate calyptra. In the holotype (NY), only mitrate calyptrae were found, but none was attached to *M. crumianum* capsules. In an isotype (ALTA), two types of calyptrae were found, loose in the package, one mitrate and the other cucullate. The former one could belong to another species (*M. cf. scoparium* Mitt.) mixed with *M. crumianum*. Further confusion could have arisen from the actual shape of the calyptra in *M. lepreurii* which is cucullate. It has a major slit to the upper third of the calyptra, but the base of it can still be somewhat fringed, giving it the appearance of a mitrate calyptra. Based on the above, *M. lepreurii* and *M. crumianum* are conspecific, with *M. lepreurii* having priority.

*Macromitrium lepreurii* occurs in secondary and open montane forests. The species is reported as new to Dominica, Guadeloupe, and Panama, and is otherwise known from the type localities in Guatemala (*M. crumianum*) and Guyana (*M. lepreurii*). For a description and figures of *M. lepreurii* see Florschuetz (1964).

Selected specimens examined : Guadeloupe: Basse-Terre, Parc National de la Guadeloupe, Mamelles de Pigeon, *Goffinet* 2358 (ALTA, NY, PMA); Dominica: St. Paul Parish, Morne Trois Pitons, *Goffinet* 2713 (ALTA); Panama: Veraguas, Cerro Narices, Santa Fé, *Salazar et al.* 13323 (ALTA, PMA).

***Macromitrium longifolium*** (Hook.) Brid. (Bryol

Univ. 1: 309, 1826).

Basionym: *Orthotrichum longifolium* Hook. (Musci Excot. 1: 44, 1818). Typus: "Ad radices Bifariae glaucae altitudine 950 hexapod., regione temperata, in devexis montis Avilae prope Caracas. Humboldt et Bonplant." (Lectotypus: BM-Wilson; Isotypus: NY).

Syn. nov.: *Macromitrium aureum* C. Muell. (Bot. Zeit. 15: 580, 1857). Typus: Brazil, "Nova Granada, Cerro Pelado: Schlim 1852 legit. Collect. Linden. sine No. cum Zyogogonte commixtum" (Lectotypus, here designated: H-Broth!).

The lectotype of *Macromitrium aureum* consists of only a single entire leaf and a few leaf fragments. The basal cells are tuberculate, the leaf margin is entire, and the upper leaf cells are strongly bulging and lens-shaped. These characters are well within the concept of *M. longifolium*. The latter is most easily recognized by its papillose setae. In his description, Mueller did not characterize the seta suggesting that the seta is smooth. Lacking this character, *M. aureum* would key out as *M. cirrosum* (Hedw.) Brid.. The distinctive lens-shaped upper leaf cells however, are characteristic of *M. longifolium* and therefore *M. aureum* is proposed as a new synonym of *M. longifolium*.

***Macromitrium punctatum*** (Hook. & Grev.) Brid. (Bryol. Univ. 1: 739 1826).

Basionym: *Orthotrichum punctatum* Hook. & Grev. (Edinburgh Jour. Sci. 1: 119, 1824). Typus: "Communicated from Brazil, together with *O. filiforme*, by Professor Raddi." (Lectotypus: BM-Hooker, Isotypus: E-Greville).

Syn.: *Macromitrium sartorii* C. Muell. (Linnaea 38: 641, 1874). Typus: "Mexico, Mirador, in arboribus sylvestribus, Florentin Sartorius vere 1873. Hb. C. Mohr." (Lectotypus, here designated: H-Broth!).

The lectotype of *Macromitrium sartorii* consists of a single branch. The leaves are plane and five-ranked when moist. The basal cells are smooth and the upper ones are strongly bulging. The apex of the leaf is acute and serrulate. All of these characters fall within the concept of *M. punctatum* (sensu Vitt, 1979). Therefore *M. sartorii* is

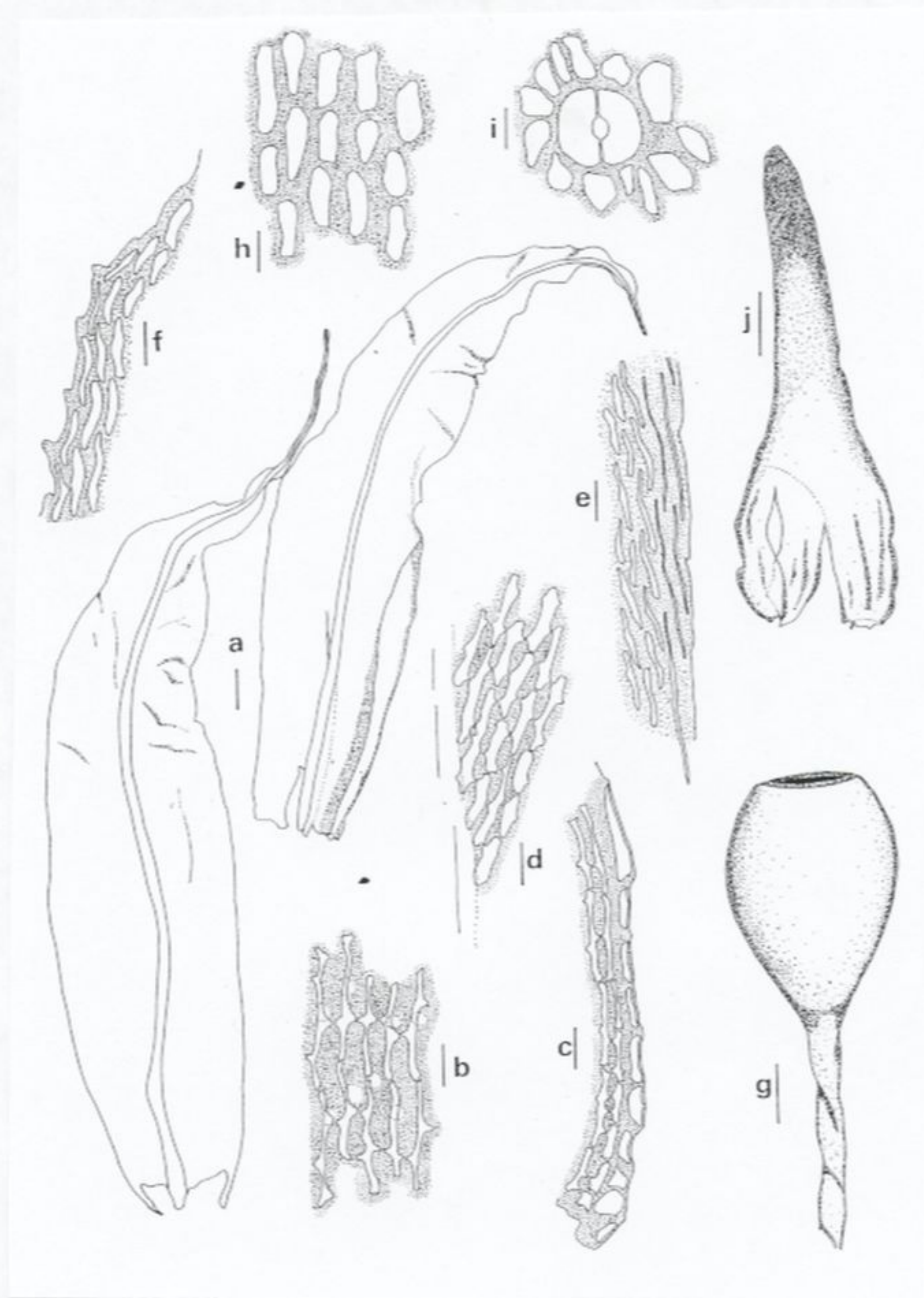
considered as synonymous with *M. punctatum*. The present synonymy was proposed by Grout (1946), but it remains uncertain whether Grout actually examined the type collection.

***Macromitrium ulophyllum*** Mitt. (J. Linn. Soc. Bot. 12: 206, 1869). Typus: Ecuador, "Andes Quitenses, Abitagua (6000 ped.), Spruce, n. 94" (Holotypus: NY!).

*Macromitrium ulophyllum* was known outside of Colombia only from Guyana (Gradstein & Florschuetz, 1989; Buck, 1990). The species is here reported from Panama (thus is new to Central America) and from Venezuela. Although *M. ulophyllum* is a distinct species, examination of herbarium material reveals that it has clearly been misinterpreted. Therefore a complete description is presented here for the first time and the species is compared to other closely related taxa.

Plants robust, shiny, light-green to golden reddish, in spreading mats. Stems with widely spaced leaves, tomentose, with numerous erect-ascending branches to about 2.5 cm. Leaves crisped, undulate, spreading from an erect base when dry, wide-spreading when moist, 3.5 to 5.0 mm long, ovate-lanceolate, more or less abruptly contracting into a slenderly acuminate apex, keeled; margins flat or recurved from the base to the middle, irregularly serrulate in the lower half to strongly serrulate towards apex; costa strong, excurrent; upper cells elongate-elliptic, smooth, porose, 20-30 x 8 µm; apical cells shorter, rhombic and non-porose; upper marginal cells long, linear, oblique and overlapping forming a distinct margin; medial cells elongate, thick walled, 100-125 (170) µm; basal cells rectangular, porose, nodose, thick walled, 30-75 x 8-10 µm, tuberculate; basal marginal cells, with thin periclinal walls and thick anticlinal walls, forming a hyaline entire border with sometimes large teeth at the base. Perichaetial leaves to 4 mm long, erect, lanceolate, acuminate, with excurrent costa. Phyllodioicous, dwarf males seen on leaves. Setae to 25 mm long, twisted counter-clockwise in upper half, smooth; capsule 1.5 mm long, ovate-oblong, contracted at the mouth,





**Fig. 1.** *Macromitrium ulophyllum*. a. Branch leaves. b. Basal cells. c. Basal margin. d. Mid-leaf juxtacostal cells. e. Midleaf margin. f. Apical margin. g. Capsule. h. Exothecial cells. i. Stomata. j. Calyptra. (a, d, e, f & j *Spruce 94*, lectotype; b-c, *Goffinet 942a*; g-i, *Salazar 13283*, bar equals 0.2 mm for A, 20  $\mu$ m for b, c, d, e, f, h & i, and 0.5 mm for g & j).

smooth or slightly ribbed when old and dry, rim erect, exothecial cells round-quadrangle (1:1) to elongate (4:1), thick walled; stomates superficial, numerous in the neck of the capsule; peristome single, consisting of a low membrane of 16, truncate, papillose, exostome teeth. Calyptrae mitrate, naked, smooth, lacinate. Spores not seen.

*Macromitrium ulophyllum* can be distinguished from all other congeneric taxa by its upper leaf cells arranged in radiating rows and bordered by long linear cells (Fig. 1). *Macromitrium ulophyllum* resembles the more widespread *M. subcirrosum* C. Muell., but the latter has smooth, linear-lanceolate leaves, no distinct margin, and the upper cells form irregular rows. *Macromitrium trachypodium* Mitten, endemic to northern South America, is also similar to *M. ulophyllum* by its leaf shape and habit, however differs by the lack of a serrate leaf margin, and plicate capsules.

Specimens examined: Panama: Chiriqui, Fortuna, Cerro Hornito, *Goffinet* (with *Salazar & Espinosa*) 942a (ALTA, PMA) & 942b (PMA); Chiriqui, Fortuna, Continental Divide, *Goffinet* (with *Salazar & Espinosa*) 1034 (ALTA, PMA, NY); Veraguas, Cerro de los Gringos, *Salazar et al.* 13283 (ALTA, PMA). Venezuela: Rio Negro, Cerro de Neblina, *Buck* 12689 & 13016 (ALTA, NY).

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